

This species is closely related to *Chikusichloa aquatica*, from which it differs chiefly in the awnless cream-white spikelets, shorter stipes, linear panicles, and in the glaucous firm blades. The specimens seen consist of the upper part of the plant, about 60 cm. long, with 4 leaves crowded above and the lower internodes 7–11 cm. long.

MAMMALOLOGY.—*Six new white-footed mice* (*Peromyscus maniculatus* group), from islands off the Pacific Coast.<sup>1</sup> E. W. NELSON and E. A. GOLDMAN, U. S. Biological Survey.

In *Revision of the mice of the American genus Peromyscus* (North Amer. Fauna, No. 28, pp. 96–98, Apr. 17, 1909) Osgood referred specimens from the islands of San Miguel, San Nicolas, Santa Barbara, and Santa Rosa of the Santa Barbara group, off the coast of southern California, to *Peromyscus maniculatus clementis* which was originally described from San Clemente Island. Those from Santa Cruz Island were assigned to *P. m. catalinae*, of Santa Catalina Island. Specimens from Natividad Island and San Martin Island, off the coast of Lower California, were referred (l. c., p. 100) to *P. m. geronimensis*, typical on San Geronimo Island.

More than 20 years have passed since the fine monograph mentioned was published. In commenting upon material examined from the various islands the author pointed out in several instances characters which he regarded as too slight to afford a basis for satisfactory separation. Finer distinctions are being made by many workers at the present time, and it seems to us probable that if the same reviser were reviewing this part of his work his viewpoint would be somewhat altered. Some of the islands are separated by 50 miles or more of open sea, while others lie somewhat nearer together. San Miguel and Santa Rosa Islands, with a comparatively narrow passage between them, appear to be inhabited by the same form. Study of the fairly ample material available has shown that although the characters presented in varying combinations from island to island are relatively slight they are maintained with rather remarkable constancy. Such characters are, as in many other similar places, the expression of genetic factors resulting through isolation and response to environmental influences favoring their perpetuation. These insular forms, with ranges sharply

<sup>1</sup> Received November 19, 1931.

definable, are more readily and satisfactorily segregated than would be the case with many similarly differentiated mainland forms with ranges merging almost imperceptibly. We believe they should be recognized as interesting and tangible steps in the evolutionary process involved in the development of species.

New subspecies are described as follows:

***Peromyscus maniculatus streatori* subsp. nov.**

San Miguel Island Mouse

*Type*.—From San Miguel Island, off coast of southern California. No. 34631/46716, ♂ old adult, U. S. National Museum (Biological Survey collection), collected by C. P. Streater, June 24, 1892. Original number 1861.

*Distribution*.—San Miguel and Santa Rosa Islands.

*General characters*.—A dark subspecies, similar to *Peromyscus maniculatus clementis* of San Clemente Island, but darker and browner, less buffy; general size about the same but ears usually slightly smaller; skull more slender in structure. Closely resembling *P. m. catalinae* in color; general size similar, but tail longer; ears slightly smaller; cranial characters, especially the smaller braincase, distinctive.

*Color*.—*Type*: Upper parts in general near wood brown (Ridgway, 1912) with a dull cinnamon suffusion on cheeks, shoulders, and along sides, the top of head and back moderately mixed with black; underparts in general dull white; a small ochraceous buffy area at base of tail; forelimbs and hind feet white; ears dusky, indistinctly edged with white; tail bicolor, brownish above, white below.

*Skull*.—Similar to that of *P. m. clementis* but of slenderer proportions, the rostrum narrower, more attenuate; interorbital region narrower; interparietal smaller (shorter antero-posteriorly). Compared with that of *P. m. catalinae* the skull differs notably as follows: Braincase smaller, less inflated; interorbital region narrower; interparietal smaller (shorter antero-posteriorly).

*Measurements*.—*Type*: Total length, 170 mm.; tail vertebrae, 80; hind foot, 20. Average of 10 adult topotypes: 175 (160–185); 82 (77–86); 21 (21–22).

*Skull* (type): Greatest length, 25.7; condylobasal length, 23.5; zygomatic breadth, 13.2; interorbital breadth, 4; interparietal, 9.1 × 2.1; length of nasals, 10.5; maxillary toothrow, 3.7.

*Remarks*.—*P. m. streatori* is one of the smaller forms of *P. maniculatus* inhabiting the Santa Barbara group of islands. It is larger and darker-colored and scarcely requires close comparison with *P. m. gambeli*, of the adjacent mainland. Specimens from Santa Rosa Island appear to be inseparable from those from San Miguel Island.

*Specimens examined*.—Total number, 38, as follows:

California: San Miguel Island (type locality), 25; Santa Rosa Island, 13.

**Peromyscus maniculatus santacruzae** subsp. nov.

## Santa Cruz Island Mouse

*Type*.—From Santa Cruz Island, off coast of southern California. No. 47449, ♀ old adult, U. S. National Museum (Biological Survey collection), collected by C. P. Streater, July 13, 1892. Original number 1923.

*Distribution*.—Known only from Santa Cruz Island.

*General characters*.—A large dark subspecies, closely allied to its geographic neighbor *Peromyscus maniculatus streatori*, of San Miguel Island, but usually decidedly larger with very noticeably longer tail; color about the same. Similar to *P. m. catalinae*, of Santa Catalina Island, but tail longer, ears usually smaller, and cranial details distinctive. Differing from *P. m. clementis* as follows: General size larger, tail decidedly longer; color somewhat duller, more brownish, less suffused with buff; buffy lateral line less distinct.

*Color*.—*Type*: Upper parts near wood brown, suffused with cinnamon buff on cheeks, shoulders, flanks, and outer surfaces of limbs, the top of head and back moderately overlaid with brownish black; under parts dull white; ears dusky, indistinctly edged with white; tail bicolor, brownish above, whitish below.

*Skull*.—Closely resembling that of *P. m. streatori*, but larger and heavier; interparietal small as in *streatori*. Similar to that of *P. m. catalinae*, but braincase somewhat smaller, less fully inflated; interorbital region usually narrower; interparietal smaller (shorter antero-posteriorly). Compared with that of *P. m. clementis* the skull is similar in general form, but larger; interparietal smaller (shorter antero-posteriorly).

*Measurements*.—*Type*: Total length, 207; tail vertebrae, 99; hind foot, 22. Average of 10 adult topotypes: 194 (184-214); 96 (88-105); 22 (21-23). *Skull* (type): Greatest length, 27.7; condylobasal length, 25.7; zygomatic breadth, 14.4; interorbital breadth, 4.2; interparietal, 8.7 x 2.6; length of nasals, 11.2; maxillary toothrow, 3.9.

*Remarks*.—*P. m. santacruzae* is a large subspecies interposed in geographic range between the smaller form, *P. m. streatori* of San Miguel and Santa Rosa Islands and the still smaller mainland animal, *P. m. gambeli*. It differs conspicuously from the latter not only in larger size, but in darker color. The smaller ears of specimens from Santa Cruz Island, compared with typical *P. m. catalinae* was pointed out by Osgood (l. c. p. 98).

*Specimens examined*.—Twenty-five, all from Santa Cruz Island.

**Peromyscus maniculatus exterus** subsp. nov.

## San Nicolas Island Mouse

*Type*.—From San Nicolas Island, off coast of southern California. No. 92098, ♀ old adult, U. S. National Museum (Biological Survey collection), collected by H. A. Gaylord, May 23, 1897.

*Distribution*.—Known only from San Nicolas Island.

*General characters*.—One of the smaller of the California insular races, very similar to *Peromyscus maniculatus streatori* of San Miguel Island, but ears larger; color paler, more cinnamon buffy, less brownish or dusky, especially on posterior part of dorsum. Similar to *P. m. clementis*, but lighter buff, and cranial details quite distinctive. Decidedly smaller in general than *P. m. santacruzae*, but with slightly larger ears; color brighter, more buffy, less brownish, the lateral line more distinct. Differing from *P. m. catalinae* in lighter, more buffy instead of brownish color, the lateral line more evident; skull exhibiting a departure in detail.



*Color.*—*Type*: Upper parts cinnamon buff, purest on cheeks, shoulders, lateral line and interfemoral area, the top of head and back moderately overlaid with brownish black; under parts white; ears dusky, faintly edged with white; outer sides of forearms cinnamon buffy; outer sides of ankles dark brownish; tail bicolor, brownish above, white below.

*Skull.*—Closely similar to that of *P. m. streatori*, but upper outline highest near anterior border of frontals (highest near posterior border in *streatori*); braincase slightly larger; interparietal short (antero-posteriorly) as in *streatori*. Compared with that of *P. m. clementis* the skull is slenderer, with narrower and slightly flatter frontal region; nasals narrower; outer wall of antorbital foramen narrower, as viewed from the side; interparietal smaller (shorter antero-posteriorly). In contrast with *P. m. catalinae* the braincase is smaller, less fully inflated; interorbital region narrower; interparietal smaller (shorter antero-posteriorly). Differing from that of *P. m. santacruzae* mainly in smaller size.

*Measurements.*—*Type*: Total length, 183; tail vertebrae, 88; hind foot (dry skin), 20. Average of 10 adult topotypes: 177 (171–187); 82 (76–88); 20 (19.5–21). *Skull* (type): Greatest length, 25.7; condylobasal length, 23.5; zygomatic breadth, 23; interorbital breadth, 4; interparietal, 8.2 x 1.9; length of nasals, 10.3; maxillary toothrow, 3.8.

*Remarks.*—*P. m. exterus* inhabits the outermost of the Santa Barbara group of islands. Cranial characters indicate closer relationship to *P. m. streatori* of the islands of San Miguel and Santa Rosa to the northwest than to *P. m. clementis* of San Clemente Island, nearly equidistant to the southeast. In paler, more buffy coloration, however, it tends toward *clementis* which in turn is paler as compared with *P. m. catalinae*. The somewhat lighter coloration of the mice on these farther off shore islands suggests the presence of some differential influence. Many animals from within the fog belt along the Pacific coast are well known to exhibit dark colors. Possibly fog is less prevalent on San Nicolas and San Clemente, which are 50 miles or more off shore, than on the other islands all of which are considerably nearer the coast.

*Specimens examined.*—Twenty-four, all from San Nicolas Island.

### *Peromyscus maniculatus elusus* subsp. nov.

Santa Barbara Island, Mouse

*Type.*—From Santa Barbara Island, off coast of southern California. No. 92049, ♂ adult, U. S. National Museum (Biological Survey collection), collected by H. A. Gaylord, May 16, 1897. X catalogue number 1095.

*Distribution.*—Known only from Santa Barbara Island.

*General characters.*—A dull brownish subspecies similar to *Peromyscus maniculatus clementis* but upper parts darker, the general tone brownish instead of buffy; skull differing in detail. Approaching *P. m. catalinae* in color, but ears smaller, and cranial characters distinctive. Closely resembling *P. m. santacruzae*; color about the same; size smaller; tail decidedly shorter; skull slightly different. Similar to *P. m. exterus* of San Nicolas Island, but darker, duller, more brownish in color; ears slightly smaller; skull diverging in minor features.

*Color.*—*Type*: Upper parts in general near wood brown, moderately mixed with black on top of head and over back; lateral line pinkish buff, but rather indistinct; under parts dull white; ears dusky, faintly edged with white; outer sides of forearms and hind legs buffy brownish; tail bicolor, brownish black above, white below.

*Skull*.—Very similar to that of *P. m. clementis*, but interparietal smaller (shorter antero-posteriorly); frontal region slightly flatter, with a less distinct longitudinal median groove or trough. Compared with *P. m. catalinae* the braincase is smaller, flatter, less inflated, and the interparietal is smaller. Slightly broader and heavier than *P. m. streatori* or *P. m. exterus*; rostrum and interorbital region broader; parietal with antero-external angle forming a less acute point. Differing from *P. m. santacruzae* mainly in smaller size and slightly rounded, instead of acutely pointed, antero-external angle of parietal.

*Measurements*.—*Type*: Total length, 166; tail vertebrae, 70; hind foot (dry skin), 20. Average of six adult topotypes: 174 (165–190); 75 (67–88); 20 (20–21). *Skull* (type): Greatest length, 26; condylobasal length, 23.3; zygomatic breadth, 12.6; interorbital breadth, 4.3; interparietal, 9.3 x 2; length of nasals, 10.3; maxillary toothrow, 3.8.

*Remarks*.—Specimens from Santa Barbara Island have hitherto been referred to *P. m. clementis* which was originally described from San Clemente Island. A difference in color, however, while not striking is quite appreciable, especially when the series from the two islands are placed side by side; and the slight cranial characters are distinctive. In color *P. m. elusus* more nearly resembles *P. m. santacruzae*, and the skulls are not widely different, but it averages decidedly smaller, and the slightly rounded, instead of acutely pointed, antero-external angle of the parietal is quite constant.

*Specimens examined*.—Twenty, all from Santa Barbara Island.

#### *Peromyscus maniculatus martinensis* subsp. nov.

##### San Martin Island Mouse

*Type*.—From San Martin Island, off west coast of Lower California, Mexico. No. 138979, ♀ adult, U. S. National Museum (Biological Survey collection), collected by Nelson and Goldman, August 13, 1905. Original number 17726.

*Distribution*.—Known only from San Martin Island.

*General characters*.—A large medium-colored (neither very light nor very dark) insular subspecies, distinguished from its near relatives by a combination of slight but fairly constant cranial details. Very similar to *Peromyscus maniculatus geronimensis* of San Geronimo Island; size and color about the same, but differing especially in the broader, less tapering rostrum and more projecting supraoccipital region. Decidedly paler than *P. m. dubius*, of Todos Santos Island, and skull differing in minor features. Paler than *P. m. gambeli* and darker than *P. m. coolidgei*, and larger, more robust, than either of these mainland forms.

*Color*.—*Type*: Upper parts cinnamon buff, purest on cheeks, shoulders, and distinct lateral line, moderately mixed with black on top of head and over back; under parts in general dull white, the basal color plumbeous except on throat and lips where the short hairs are white to roots; a small buffy area at base of tail; fore limbs whitish; outer sides of hind legs dull buffy, becoming whitish on feet; ears brownish dusky, narrowly and inconspicuously edged with white; tail brownish above, white below. Some of the topotypes are lighter and others darker above than the type.

*Skull*.—Very similar in size and general form to that of *P. m. geronimensis*, but frontal region slightly more arched, less flattened anteriorly; rostrum usually broader, nasals broader, less tapering anteriorly; supraoccipital with a more prominent posteriorly projecting median angle, this portion of the cranium extending farther over the foramen magnum beyond the plane of

the condyles; palatal pits larger. Not very unlike that of *P. m. dubius*, but interparietal smaller; nasals usually narrower.

*Measurements*.—*Type*: Total length, 184; tail vertebrae, 82; hind foot, 23. Average of three adult topotypes: 182 (178–185); 81 (75–87); 22.5 (22–23). *Skull* (type): Greatest length, 27; condylobasal length, 26.3; zygomatic breadth, 12.8; interorbital breadth, 4.2; interparietal, 9.8 x 2.3; length of nasals, 10.3; maxillary toothrow, 4.

*Remarks*.—In size and external appearance *P. m. martinensis* closely approaches *P. m. geronimensis* to which the specimens upon which it is based were referred by Osgood (l. c., p. 100). The greater average width of the nasals, as compared with typical *geronimensis* was pointed out by him, and this together with the other differential cranial features mentioned here are regarded by us as sufficiently distinctive to warrant a separate name.

*Specimens examined*.—Fifty, all from San Martin Island.

### *Peromyscus maniculatus dorsalis* subsp. nov.

#### Natividad Island Mouse

*Type*.—From Natividad Island, off west coast of Lower California, Mexico. No. 80857, ♀ adult, U. S. National Museum (Biological Survey collection), collected by A. W. Anthony, August 4, 1896. Original number 96.

*Distribution*.—Known only from Natividad Island.

*General characters*.—A large subspecies similar to *Peromyscus maniculatus geronimensis*, of San Geronimo Island, but less buffy, the face usually paler and the posterior part of back and rump in contrast more heavily overlaid with black; minor cranial features distinctive. Differing from *P. m. cineritius*, of San Roque Island, in darker color.

*Color*.—*Type*: Head and anterior part of back grayish or light buffy brownish in contrast with posterior part of back and rump which is pinkish buff heavily overlaid with black; flanks buffy brownish; under parts dull white; fore limbs whitish; outer sides of hind legs buffy brownish becoming white on feet; ears dusky externally, thinly clothed internally and narrowly edged with white; tail bicolor, brownish above, white below.

*Skull*.—Size and general form about as in *P. m. geronimensis*, but nasals usually broader, less tapering anteriorly; outer wall of antorbital foramen broader, the anterior margin more rounded and projecting (more squarely truncate in *geronimensis*) as viewed from the side. Compared with that of *P. m. coolidgei* of the adjacent mainland the skull is larger, more robust, and differs in detail about as from *geronimensis*.

*Measurements*.—*Type*: Total length, 177; tail vertebrae, 73; hind foot (dry skin), 22.5. Average of three adult topotypes: 176 (174–183); 79 (75–83); 23 (22.5–23.5). *Skull* (type): Greatest length, 26.1; condylobasal length, 3.3; zygomatic breadth, 23.5; interorbital breadth, 24.2; interparietal, 9.3 x 2.8; length of nasals, 9.8; maxillary toothrow, 4.

*Remarks*.—*P. m. dorsalis* lacks the richer cinnamon buffy tones of *P. m. geronimensis*. The head and anterior part of the back are paler and grayer while the posterior part of the back and rump, suffused with lighter buff, becomes rather abruptly more heavily overlaid with black. No specimens of *P. m. cineritius*, of San Roque Island, are at hand for direct comparison, but that animal is described as pale grayish drab and apparently quite unlike the present form. *P. m. dorsalis* requires no close comparison with the smaller, paler subspecies, *P. m. coolidgei*, of the adjacent mainland.

*Specimens examined*.—Twenty-one, all from Natividad Island.